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CLAIMS

1. A method for visualizing circuit operation, comprising:

a. obtaining device activity based on one or more of measured or simulated activity;

b. expressing the device activity in a representation; and

c. representing the expressed activity in a visual form.

2. A method according to claim 1, wherein said representation includes sequence, connectivity and causal relationship information.

3. A method according to claim 1, wherein said representing step includes the step of visualizing the expressed activity in an IC CAD viewer.

4. A method according to claim 1, wherein said representing step includes the step of visualizing the device activity representation as a simulation of optical emissions that occur as a result of the device activity.

5. A method according to claim 1, wherein the obtaining step includes the steps of:

applying device activity traces as inputs to the circuit; and

measuring sequences of logical states at designated elements.

6. A method according to claim 5, wherein the expressing step includes the step of expressing the measured sequences in a sequence graph format.

7. A method according to claim 1, wherein said obtaining step includes the step of obtaining an activity trace based on one or more of measured or simulated activity.

8. A method according to claim 1, wherein the visual form is a slow motion animation.

9. A method according to claim 8, wherein the slow motion animation is a video visualization.

10. A method according to claim 1, wherein the visual form is an animated schematic.

11. A method according to claim 10, wherein in the animated schematic, the devices or collection of devices appear highlighted, or change color, shape or otherwise visualize the occurrence of switching.

12. A method according to claim 1, wherein audio representation of circuit activity augments the visualization by the occurrence of sound in conjunction with the visual indication of circuit activity.

13. A method according to claim 12, wherein the audio frequency or other audio character is related to the timing relationships of the switching events.

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14. A method according to claim 13, wherein the timing relationships of the switching events include delay from prior switching event, or device transition speed, or input to output delay.

15. A method according to claim 1, wherein switching behavior is mapped to a mathematical graphical representation which is related to a netlist.

16. A method according to claim 4, further comprising the step of modeling the emissions as a hot electron photoluminescence model.

17. A method according to claim 4, further comprising the step of assigning the emission based on a two-state (optically active or not) model according to whether the device is switching or not.

18. A method according to claim 17, wherein the method of determining the switching state of a device is by thresholding the current.

19. A method according to claim 17, further comprising the step of assigning the switching state by checking for logical state (0 or 1) transitions at nets corresponding to the terminals of a device to detect if the device switches in response to the input level(s) to the device.

20. A method according to claim 4, wherein an areal (x-y) view of the simulation is produced from the simulation emission.

21. A method according to claim 1, further comprising the step of designating regions of a device as an array of "pixels" overlaid to the device.

22. A method according to claim 20, wherein the areal distribution model is a Gaussion distribution from point sources from designated areas of the device.

23. A method according to claim 22, wherein the illumination intensity at each pixel results from a Monte Carlo simulation of events.

24. A method according to claim 1, wherein the visual form is a current flow animation.

25. A method according to claim 1, wherein the visual form is a local power dissipation animation.

26. A method according to claim 1, wherein the visual form is a verification trace animation.

27. A method according to claim 1, wherein the simulated activity is a circuit electrical simulation and is conducted for manufacturing test and subsequently animated.

28. A method according to claim 1, wherein the visual form is a sequence graph depicting the causal order of waveform transition events.

29. A method according to claim 27, wherein the electrical simulation is conducted for manufacturing test and subsequently animated for optical emission.

30. A method according to claim 1, wherein optical emission measurement data is compared to optical emission simulation data and the regions (in x,y,t) of agreement and/or disagreement between the two are identified.

31. A method according to claim 1, wherein logical state data gathered from optical emission measurement is compared to logical state data from simulation and the areas (in x,y,t) of agreement and/or disagreement between the two are identified.

32. A method according to claim 1, wherein the expressing step includes the step of expressing the device activity in a sequence graph format.

33. A method according to claim 32, wherein the sequence graph is derived from a netlist or schematic, and comprises a record of the events that occurred within the network as a result of the system input.

34. A method according to claim 1, wherein the obtaining step includes the step of obtaining optical emissions from the circuit as a result of stimuli input to the circuit.

35. A method according to claim 34, wherein the optical emissions are generated by switching activity caused by the input stimuli.

36. A method according to Claim 1, wherein:

the obtaining step includes the steps of

i) using an instruction trace to obtain a first representation of device activity, and

ii) using a testvector sequence to obtain a second representation of device activity; and

further including the step of comparing the first and second representations to determine how well the testvector recreates the activity generated by the instruction trace.

37. A method according to Claim 1, wherein:

the obtaining step includes the step of using a testvector sequence to cause device activity; and

further including the step of analyzing said device activity to verify or debug the testvector sequence.

38. A method according to claim 1, wherein the circuit is an asynchronous circuit.

39. A system for visualizing circuit behavior, comprising:

a. means for simulating circuit activity;

b. means for expressing the circuit activity as a device activity representation; and

c. means for visualizing the device activity representation as a simulation of optical emissions that may occur as a result of device activity.

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40. A system according to claim 36, wherein said device activity representation includes sequence, connectivity and causal relationship information.

41. A system according to claim 36, wherein said means for visualizing includes an IC CAD viewer for visualizing the expressed activity.

42. A system according to claim 36, wherein said means for visualizing includes means for visualizing the device activity representation as a simulation of optical emissions that occur as a result of the device activity.

43. A system according to claim 36, wherein the means for simulating circuit activity includes:

means for applying device activity traces as inputs to the circuit; and

means for measuring sequences of logical states at designated elements.